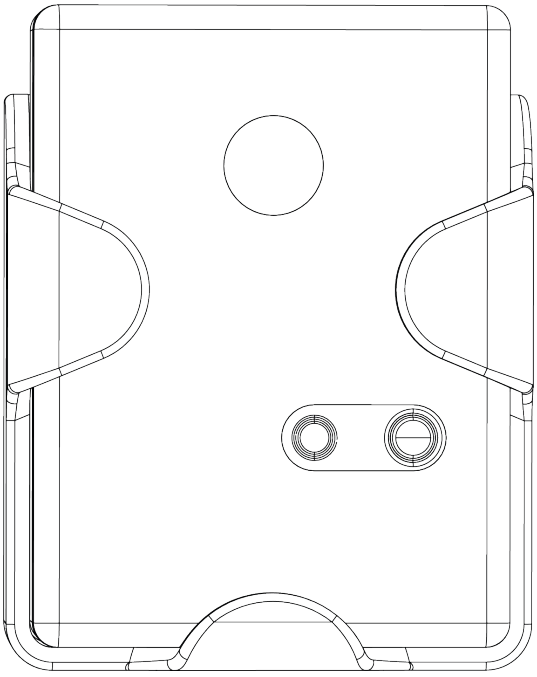
Temperature sensors
WTS-10
WTS-11
WTS-12



Manual for use

English translation of the original German manual

Status: 08/2024

Table of contents

1 Information on use

This manual will help you to use the temperature sensors safely:

- WTS-10
- WTS-11
- WTS-12

The temperature sensors are referred to below as the device.

1.1 Keep this manual handy

This manual is an integral part of the device.

► Read the manual carefully before first use.
► Follow the instructions and specifications in this manual.
► Keep this manual for the duration of use of the device.
► Keep the manual for future reference.
► If the maunal is lost or has become illegible, request a new copy from the manufacturer.
► Please pass on this manual if you sell or otherwise transfer the device.

1.2 Copyright

2 Safety

2.1 Intended use

The device is a sensor and is used to monitor the temperature of food in commercial kitchens, warehouses or during transport.

The device is compatible with LoRaWAN version 1.0.3 and can work with standard LoRaWAN gateways (receivers).

Intended use includes reading, understanding and following the instructions in this manual.

Any other use is expressly considered to be improper use.

2.2 Basic safety instructions

Fire prevention

The device contains a built-in lithium-ion battery. There is a risk of fire if the battery is damaged.

- Do not remove the lithium-ion battery from the device.

Prevent injuries due to improper repair

- Do not modify the device.

Reduce high frequency exposure

This device complies with the applicable RF emission limits for devices operated in an uncontrolled environment.

- To reduce exposure to high frequencies, hold the device approximately 20 cm away from your body.

Prevent environmental damage

- Dispose of the device and its components in accordance with local regulations.

2.3 Avoid material damage and malfunctions

Avoid damaging the device

- Do not drop the device.
- Avoid impact loads.

Avoid damage from incorrect cleaning

Cleaning with solvents and abrasives may damage the device.

- Use only alkaline detergents to clean the device.

2.4 Design features of the warnings

⚠ WARNING	
	**Notices with the word WARNING warn of a dangerous situation that can possibly lead to death or serious injury.**

2.5 Design features of the notices regarding property damage

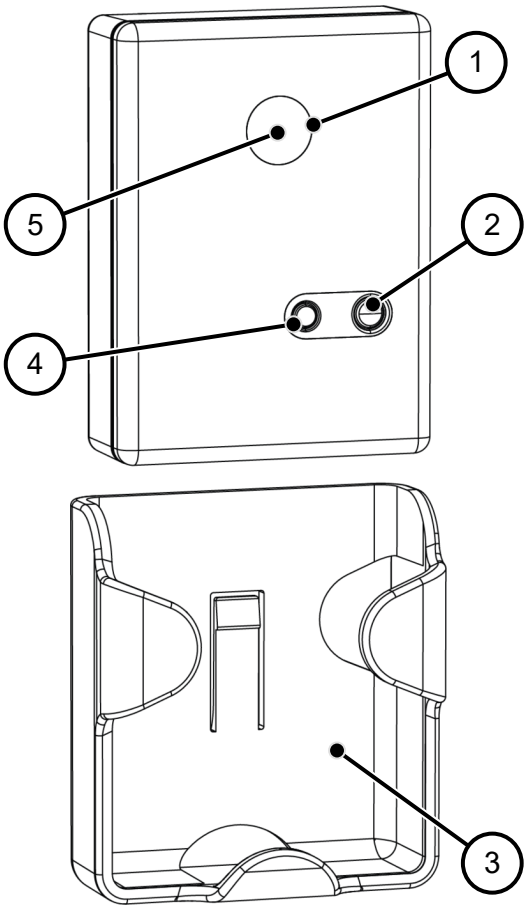
NOTE!
These instructions warn of a situation that may result in material damage and reduced functionality.

3 Description

3.1 Scope of delivery

- Device in the selected version
- Adhesive pad

3.2 Overview WTS-10



① Internal sensor for measuring temperature

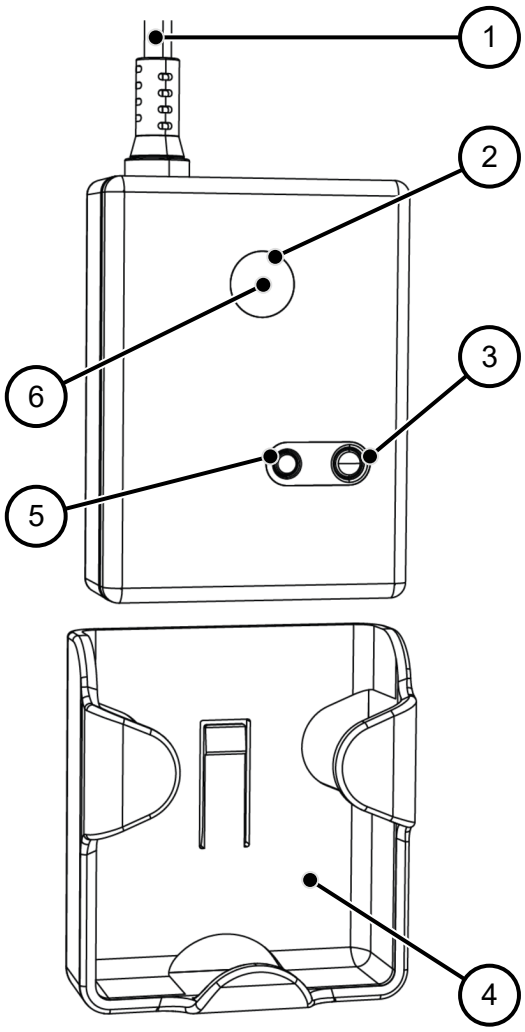
② Button for activating and deactivating the operating modes

③ Bracket

④ LED

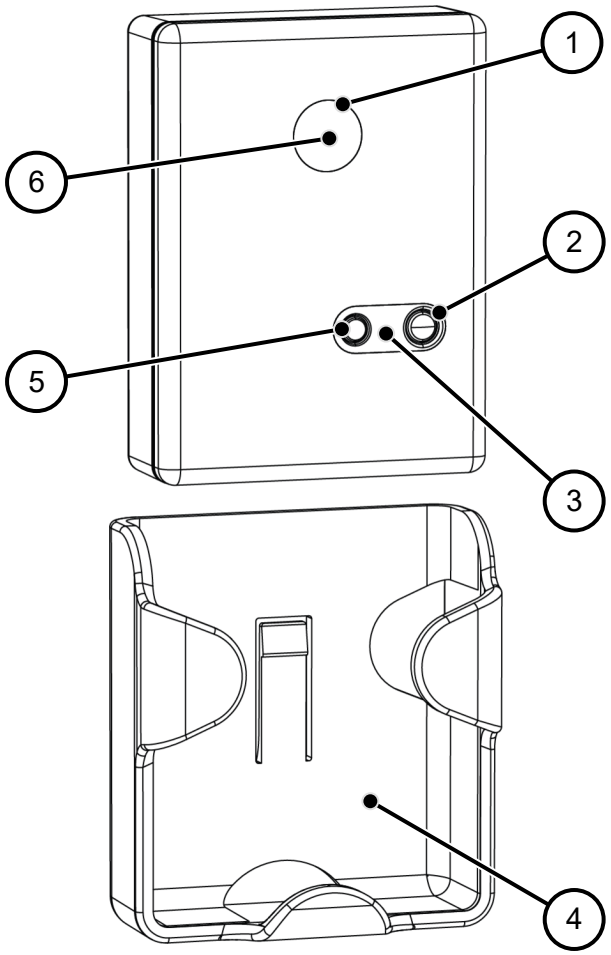
⑤ Measuring point

3.3 Overview WTS-11



① External temperature sensor cable (see page 19)
② Internal sensor for measuring temperature
③ Button for activating and deactivating the operating modes
④ Bracket
⑤ LED
⑥ Measuring point

3.4 Overview WTS-12



① Internal sensor for measuring temperature

② Button for activating and deactivating the operating modes

③ Sensor for light detection and alarm (not shown)

④ Bracket

⑤ LED

⑥ Measuring point

3.5 LCD display

The device has a four-colour LED. It flashes/lights up as follows:

- Flashes green 5 times after restart.
- Illuminates green when the device is connected.

In normal operating mode:

- Illuminates red when the device is switched off.
- Illuminates blue when the external sensor is connected.
- Flashes one time blue or red for each uplink (see page 11).
- Flashes one time purple for each successful downlink (see page 11).

3.6 Task and function

The device is used to monitor the temperature of food in commercial kitchens, warehouses or during transport. It has been developed on the basis of LoRa (wireless transmission method).

The device can be placed in various refrigerators and warming cabinets. It can be attached to the desired location using the adhesive pad supplied.

The device has a built-in sensor. The sensor measures the temperature and sends the recorded data at a specified interval (see Uplink) to the surrounding gateways (receivers). As a result, the gateways (receivers) receive all data within range. The gateways then forward the received measurements to the LoRaWAN network servers. The measurements are then evaluated and analysed with ConnectedCooking.

The WTS-11 device also has an external sensor (temperature sensor). It allows the user to manually measure the temperature of the food.

The WTS-12 device also has the “light detection and alarm” function. This allows the device to monitor the opening status of the refrigerator or warming cabinet and send an alarm if the time is exceeded (five minutes by default).

The device has a data logger. This allows the user to retrieve the stored data via the LoRaWAN network (chirpstack) when required.

To retrieve (downlink) or view the recorded data, the device must be registered with ConnectedCooking (see from page 20).

3.7 Uplink

The data transmission interval is factory set to 20 minutes.

3.8 Downlink

The downlink is performed as required.

3.9 Operating modes

The device has the following operating modes:

- Deep sleep mode
- Work mode
- Stop mode

In deep sleep mode, the device is deactivated. This mode is used for storage and shipping to conserve the battery.

In work mode, the device can join the LoRaWAN network and send measurement data to the LoRaWAN network server via LoRaWAN gateways (receivers).

Between individual transfers, the device is in stop mode. In this mode, the device has the same power consumption as in deep sleep mode.

3.10 Power supply

The device is operated with a permanently installed lithium-ion battery (4000 mAh). This is non-rechargeable and can be used for a maximum period of 10 years after activation. The device must then be disposed of.

3.11 Calibration

Calibration has been performed at the factory. No recalibration is required.

3.12 Information on the device and packaging

The following information can be found on the device and the packaging:

- Manufacturer
- Importer
- QR code (self-test sensors. Perform the measurement)
- Model
- LoRa frequency
- Serial number
- FCC ID
- CE
- Disposal

4 Before use

4.1 Unpacking and checking the scope of delivery

- ► Remove the device from its original packaging.
- ► Check that the device has been supplied in the selected version.
- ► Check the device for cracks, fractures, etc.
- ► Contact the manufacturer if the device is faulty or damaged.

4.2 Register device

- ► Find the serial number on the device.
- ► Register the device in ConnectedCooking (see page 20).

4.3 Perform a self test

We recommend that you perform a self-test before first use.

- ► Scan the QR code on the device or packaging.
- ► Perform the self-test as described there.

5 Position the device

5.1 Instructions for placement

The device can be placed in warming cabinets and various refrigerators.

In refrigerated areas, the device must be positioned so that it can detect the actual room temperature of the refrigeration unit. Each refrigeration unit has different temperature ranges. Depending on the refrigeration unit, it is therefore necessary to decide at which temperature point the measurement should be made so that the temperature also meets food safety requirements. Therefore, the device should be positioned as follows:

- in cold stores (warehouses) below the intake area. An external temperature sensor for the refrigeration unit is often located in the cold store. The device can also be placed there.
- in chiller cabinets/freezers, at the warmest refrigeration point in the upper section, provided that the food is also cooled there,
- in the upper third of recirculating chillers,
- with quiet cooling at maximum storage height.

The following illustrations (1 to 6) show some examples of how the device can be positioned.

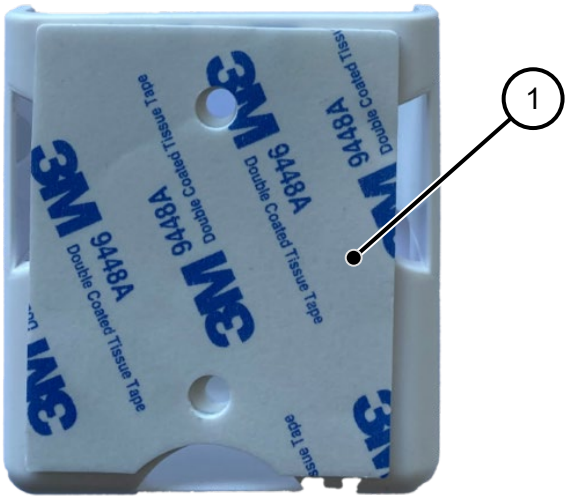
5.2 Clean attachment point

- ► Always clean the attachment point thoroughly before placing.
- ► For freezers, first defrost and wipe the attachment point dry.

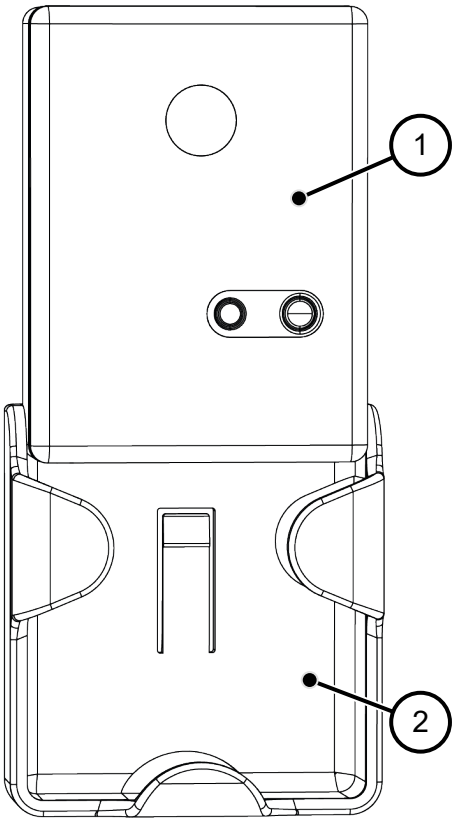
5.3 Glue the device to the cooling point

ⓘ The adhesive pad will only hold in a temperature range of 10-30°C.

- ► Attach the adhesive pad to the bracket as shown (1).
- ► Remove the protective film.



- ► Attach bracket (2) to cleaned area and glue on.
- ► Insert the device (1) into the bracket (2).



6 Operating the unit

6.1 Requirements

- The device is connected to a suitable LoRaWAN gateway (receiver) registered in ConnectedCooking.
- The gateway is connected to a LoRaWAN network server.

ⓘ For more information about the gateway, see the Gateway User Manual.

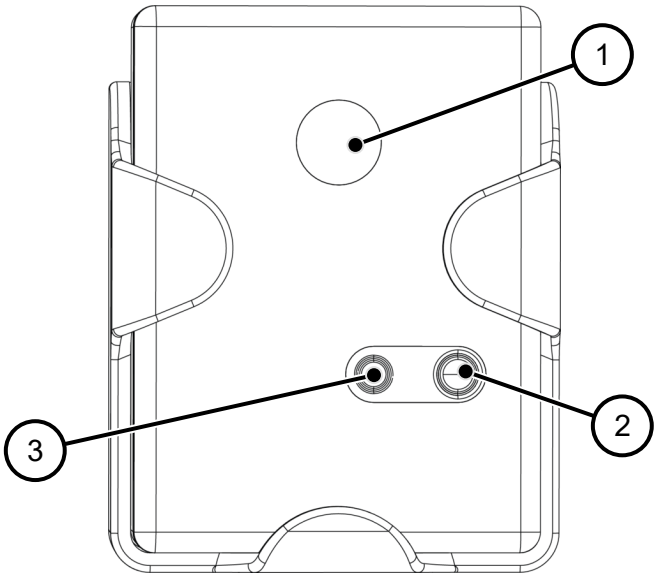
6.2 Activate device

► Press the button (2) for more than three seconds until the LED (3) flashes green five times.

The device is now in work mode and will start connecting to the LoRaWAN network. Once connected to the network, the LED (3) will turn green for 5 seconds.

The sensor (1) measures the temperature and sends the recorded data to the surrounding gateways (receivers) every 20 minutes. After each uplink, the LED (3) flashes blue five times. The gateways (receivers) forward the data to the LoRaWAN network servers, where it can be retrieved if required (see starting on page 20).

Between individual transfers, the device switches to stop mode.

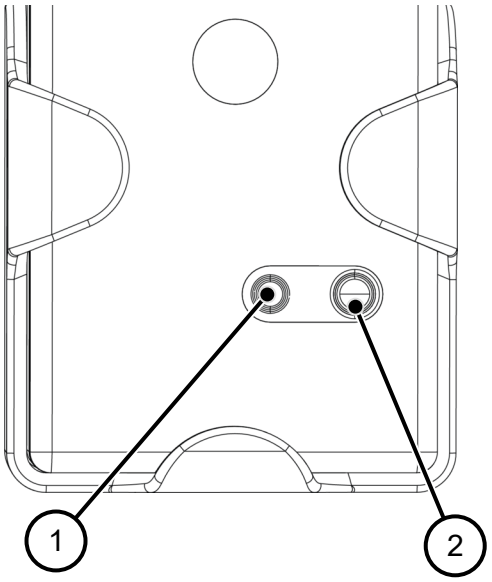


The WTS-12 also uses the light sensor to monitor the opening status of the fridge or warming cabinet and sends an alarm if the time is exceeded (five minutes by default).

6.3 Deactivate device

► Press button (2) five times.

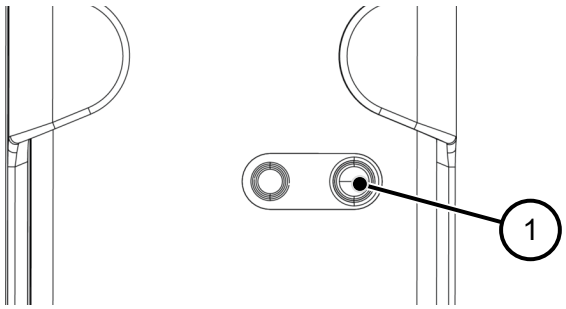
The LED (1) will illuminate red for 5 seconds. The device is now in deep sleep mode.



6.4 Perform an uplink test

► Press button (1) for approx. three seconds.

When the device is connected to the LoRaWAN network, an uplink packet is sent to the server.



6.5 Measure temperature manually with WTS-11

The WTS-11 device also has an external sensor (temperature sensor). This allows you to manually measure the temperature of the food.

- ► Remove the protective cap (2).
- ► Activate the device (see page 17).
- ► Insert the temperature sensor into the food.

The measuring point is at the tip (1) of the temperature sensor.

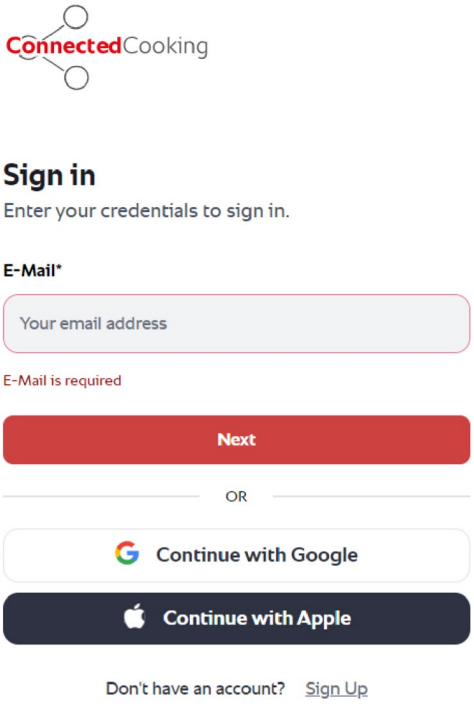
The sensor now measures the temperature and sends the recorded data via the gateway (receiver) to the LoRaWAN network server. The LED (3) flashes blue once.

- ► Remove the temperature sensor from the food.
- ► Always clean the temperature sensor after measuring (See page 27).
- ► Fit the protective cap.
- ► To retrieve the data, proceed as described from page 20.

7 Analyse and evaluate measurement data

7.1 Create a user account

- ► Tap “https://auth.connectedcooking.com/login” in the search bar of a web browser.
- ► To create a new customer account, click on “Registration”.
- ► Follow the further instructions in the dialogue menu.



After successful login, the user interface is displayed.

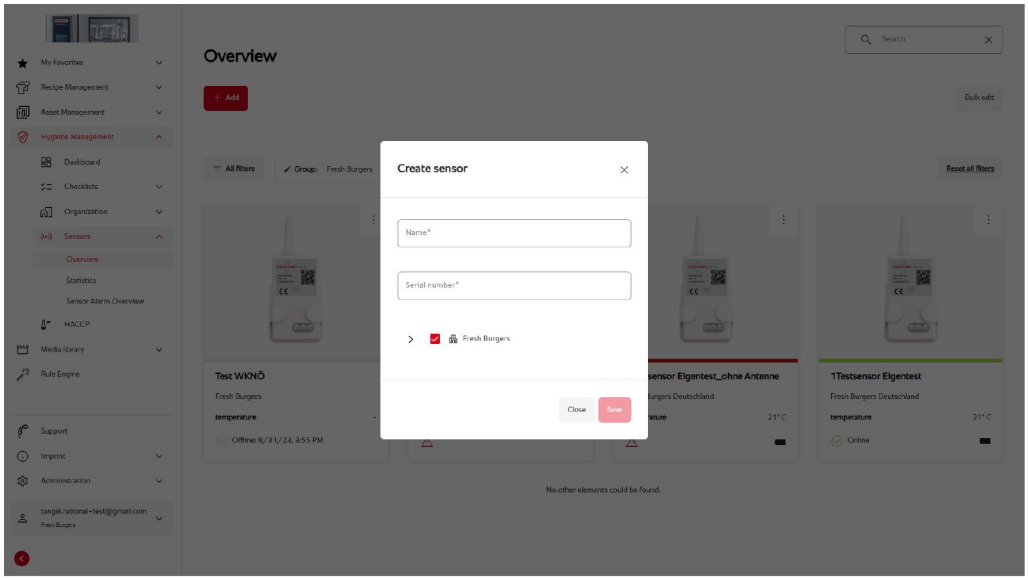
7.2 Register device

- ► Click on “Hygiene management” in the menu directory.
- ► Select “Overview” under “Sensors”.
- ► Click on “+ Add”.
- ► Click on “Sensors”.

The "Add sensor" window opens.

- ► Enter a name of your choice for the device.
- ► Enter the serial number.

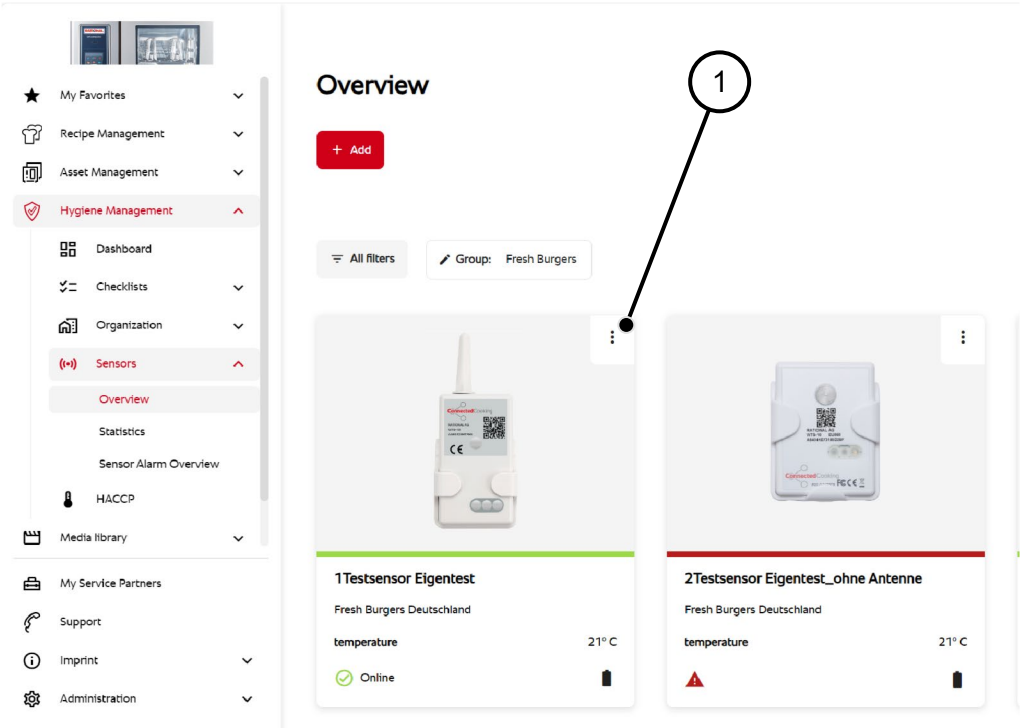
► Click on “Save”.



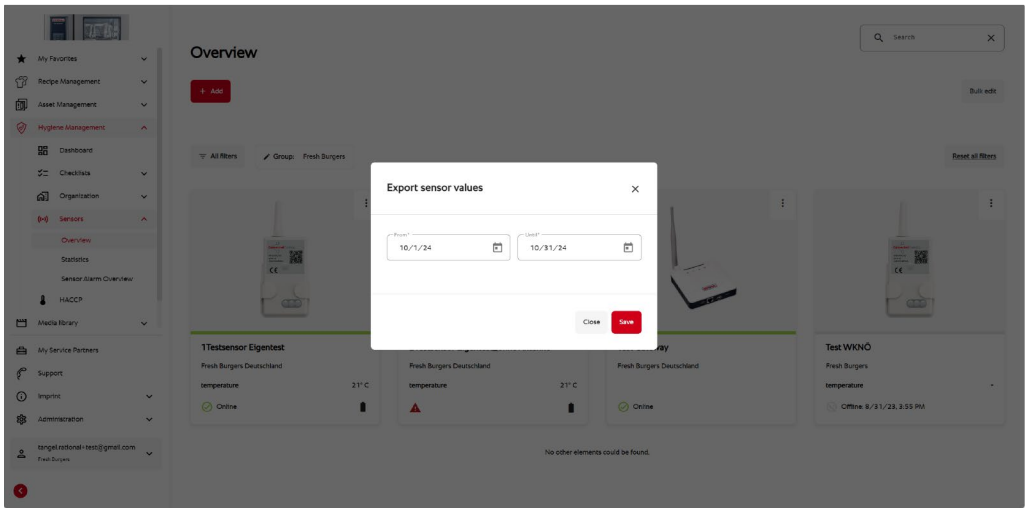
The device is now registered.

7.3 Evaluate measurement data

► Click on “Asset management” in the menu directory.
► Click on “My devices”.
► Select “Device overview”.
► Click on the desired device.
► Click on the three-dot menu (1).



- ► Select "Export sensor readings".
- ► Select the time period.
- ► Click on “Save”.



- ► Open the export file.
- ► Evaluate the measurement results.

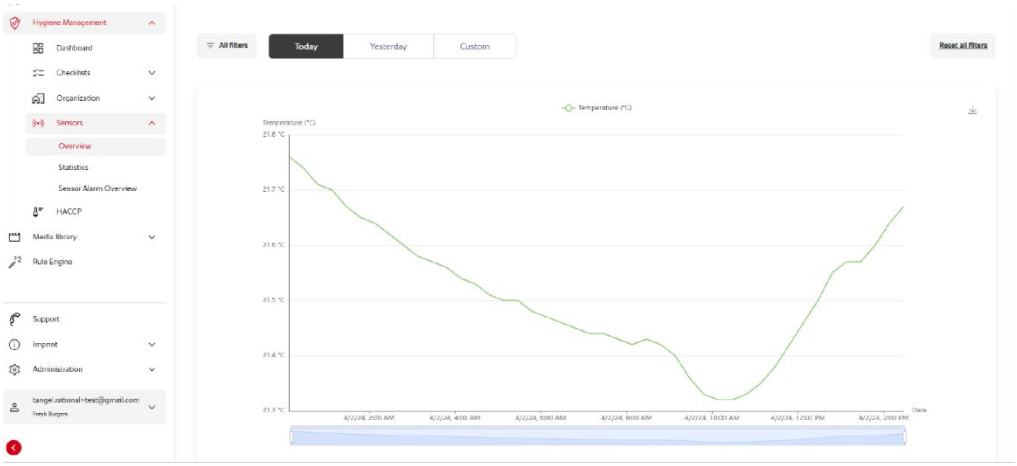
	A	B	C	D	E	F
1	Date	Time	Temperature			
20	01.10.2024	06:00:24	21.24			
21	01.10.2024	06:20:24	21.24			
22	01.10.2024	06:40:24	21.22			
23	01.10.2024	07:00:24	21.21			
24	01.10.2024	07:20:24	21.21			
25	01.10.2024	07:40:24	21.19			
26	01.10.2024	08:00:24	21.19			
27	01.10.2024	08:20:24	21.18			
28	01.10.2024	08:40:24	21.17			
29	01.10.2024	09:00:24	21.16			
30	01.10.2024	09:20:24	21.0			
31	01.10.2024	09:40:24	20.85			

ⓘ When performing a self-test, you can compare the measurement results in the export file with the result of the thermometer. The maximum deviation of the measurement results should not exceed +/- 1°C.

7.4 Show the temperature overview

- ► Click on “Hygiene management” in the menu directory.
- ► Click on “Sensors”.
- ► Select “Overview”.
- ► Select the desired sensor by clicking on it.

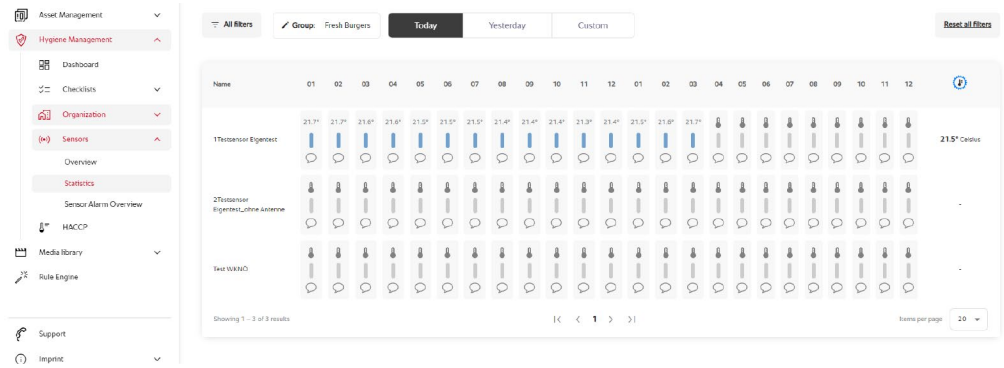
The temperature overview is displayed:



7.5 Show statistics

- ► Click on “Hygiene management” in the menu directory.
- ► Click on “Sensors”.
- ► Select “Statistics”.

The temperature graph with hourly average values is displayed:



7.6 Check signal strength

- ► Click on “Asset management” in the menu directory.
- ► Click on “My devices”.
- ► Select “Device overview”.
- ► Click on the desired device.
- ► Check the signal strength.

8 Troubleshooting

Problem	Cause	Measure
All devices are offline.	The devices are not activated. The distance between the device and the gateway is too large. The gateway is not registered in ConnectedCooking and does not have an Internet connection. The network requirements are not met. The devices and the gateway do not have the same frequency.	• Activate the devices (see page 17). • Make sure that the distance between the devices and the gateway is not too large. • Make sure that the gateway is registered in ConnectedCooking and that the gateway has an Internet connection. • Make sure that the network requirements are met. • Check the label of the devices and the gateway. All must have the same frequency (e.g. EU868).

Problem	Cause	Measure
A device is offline.	The device is not activated. The distance between the device and the gateway is too large. The gateway is not registered in ConnectedCooking and does not have an Internet connection. The network requirements are not met. The device and the gateway do not have the same frequency.	• Activate the device (see page 17). • Make sure that the distance between the devices and the gateway is not too large. • Deactivate and reactivate the device (see page 17). • Place the device directly next to a gateway or swap the device for another one. Then check whether the device goes/remains online. • Check the label of the device and the gateway. Both must have the same frequency (e.g. EU868).
A device intermittently goes offline.	The distance between the device and the gateway is too large. The device and the gateway do not have the same frequency.	• Make sure that the distance between the devices and the gateway is not too large. • Check the signal strength (See page 23). • Deactivate and reactivate the device (see page 17). • Place the device directly next to a gateway or swap the device for another one. • Then check whether the device goes/remains online.

Problem	Cause	Measure
Uplink package is not sent.	The device is not in working mode.	• Activate the device (see page 17). • Perform an uplink test (see page 18). • Check if the uplink package has been sent.
The LED does not illuminate/flash even though the device is activated.	The unit is defective.	• Replace the device.

If this does not solve the problem, contact Customer Service (see page 30).

9 Maintain the device

9.1 Perform a visual check

► Check that the LED illuminates/flashes in the corresponding mode. Make sure that the uplink package (measurement data) is sent.

9.2 Cleaning the device

NOTE!

Incorrect cleaning may damage the device.

➢ Only use alkaline cleaning agents.

► Put the device in deep sleep mode (see page 18).

► If necessary, clean the device and its components only with alkaline cleaning agents.

10 After use

10.1 Storing and transporting the device

- ► Always transport the device in its original packaging.
- ► If you do not intend to use the device for an extended period of time, deactivate it (see page 18).
- ► Clean the device (see page 27).
- ► Store the device and its components in a dry place protected from sunlight.

10.2 Dismantling the device

- ► Remove the device from the bracket.

The bracket remains at the attachment point.

ⓘ You will need a new bracket for a new installation.

10.3 Disposal

Disposing of packaging material

- ► Dispose of packaging in accordance with local waste paper disposal regulations.

Disposing of the device

⚠ WARNING

The device contains a built-in lithium-ion battery.

There is a risk of fire if the lithium-ion battery is damaged.

➢ Do not remove the lithium-ion battery from the device.

Electrical appliances are labelled with the adjacent symbol. This symbol indicates that electrical and electronic equipment must not be disposed of with household waste.

If you wish to dispose of the device, you must return it to an authorised collection or recycling point. Recycling points are, for example, the local recycling centre or recycling centre, but also retailers who sell similar products.

The device can be returned to the retailer free of charge. There is no charge for returning items with a maximum edge length of 25cm.

Electrical appliances contain valuable resources and also pollutants. The collection points hand over the old devices to certified disposal companies, which check whether the equipment can be refurbished and reused. If reuse is not possible, the old devices are treated accordingly. Pollutants are removed from the devices and valuable resources are recycled.

Batteries may also contain harmful substances that can harm the environment or your health if stored or disposed of improperly. However, these also contain important raw materials such as iron, zinc, manganese or nickel that can be recycled.

11 Technical data

Devices: WTS-10, WTS-11, WTS-12	
Device dimensions (H × W × D)	13.7 × 7 × 3 cm
Packaging size (H × W × D)	14.5 × 8 × 5 cm
Net weight	105 g
Gross weight	170 g
Housing (material)	Plastic, food-safe
Operation	Button
Operating temperature	-40 to +65°C
Power supply	Lithium-ion battery (4000 mAh)
LED	Four-coloured

Internal temperature sensor	
Operating range	40 °C to +70 °C.
High measurement accuracy	max. ±0.10 °C (-20 to 50 °C) max. ±0.15 °C (-40 to 70 °C)
Model	+/- 0.05 °C (-40 to 70 °C)
Resolution	0.01 °C

External temperature sensor WTS-11	
Operating range	-50 °C to +200 °C
High measurement accuracy Long-term drift	+/- 0.4 °C < 0.02 °C per year
Cable length	1.5 m
Metal sensor dimensions	φ 4 × 100 mm

12 Customer service

- ► If you have any problems with our device, please contact our customer service first.
  E-mail: info-de@acalbfi.de
- ► Send the device to the following address.

Acal BFi Germany GmbH
Assar-Gabrielsson-Strasse 1
63128 Dietzenbach
Germany

13 Warranty

The device is carefully inspected by Acal BFi Germany GmbH before delivery and subjected to a final inspection. However, if there is cause for complaint, our procedure is as follows:

The warranty period begins on the date of delivery and ends after 24 months, unless otherwise specified in the contract. The defects found must be reported to Acal BFi Germany GmbH within 14 days of discovery using the completed Acal return form.

The warranty covers defects that are demonstrably due to defects in materials or workmanship. Acal BFi Germany GmbH will bear the cost of rectifying the fault and the associated transport and installation costs. Any further claims are excluded.

Defective parts that are replaced become the property of Acal BFi Germany GmbH. However, these repairs do not restart the warranty period for the entire product. All repairs and servicing must be carried out by Acal BFi Germany GmbH or by specialist companies authorised by Acal BFi Germany GmbH. Failure to do so will invalidate the entire warranty.

The warranty does not apply in the event of non-compliance with the instructions for use, unsuitable or improper use, incorrect assembly (by third parties) or damage caused by third parties.

Manufacturer’s address

Acal BFi Germany GmbH
Assar-Gabrielsson-Strasse 1
63128 Dietzenbach
Germany
Phone number: +49-6074-4098-0
E-Mail: info-de@acalbfi.de
Internet: www.acalbfi.de